

Design of Safety Tools to Prevent Accidents on Hilly Region

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Abstract— Road traffic accidents (RTA) are responsible for 1.2 million deaths worldwide each year. RTA will become the 3rd largest contributor to the global burden of diseases after ischemic heart diseases (IHD) and depression. The main reasons were found to be rash driving, narrow curves, poor visibility, rain and snow and heavier traffic at night time than the rest of the day. Curve may be a blind, S- curve or U pin curve. The main reasons are lack of signboards, convex mirrors, retaining walls and light poles at critical spots. This want is resulting in recurrence of accidents. On hilly road drivers may unable to see opposite side vehicles which create accidents, so smart poll radar system can reduce accidents.

Key words: Safe Travelling, Hilly Road, Radar System, Honking Roads, Sensor

I. INTRODUCTION

With the increase in population to fulfill the requirement of transportation number of vehicles is increasing. Due to the development of infrastructure and industrialization number of vehicle in transportation business is increasing, so this has created a major concern for highway authorities also to facilitate effective control of traffic for collision avoidance. As the most traffic is on the highways for transportation, leads to requirement of more safety.

We are talking about Indian hilly road, which number of accident occur sloppy road curve. When drive can't able to see what come from the other side and accident occur. At hilly region driver phycology is they drive at middle of the road so it can safe. Both the side driver can do same they drive middle of the road and at curve they don't know other vehicle come from the other side and accident occurs.



Fig. 1: 1 U pin curve

Above the U pin curve picture. The highlighted portions in figure are curves which are risky and dangerous and our project will prove to be effective and needful on such curves.

According to Dehradun times – Times of India in the hilly districts of uttrakhand there were 512 deaths and 862 disabilities and the data of RTA 2011 stated 527 deaths and 847 disabilities. World Bank states that a road accident causes 1%-2% of gross national product (GNP). As per official data compiled by the State's Home Department accessed by greater Kashmir, 768 persons died in road accidents till October 2016, 4572 accidents were recorded by the police in JK. Similarly the only hill station in Gujarat i.e. Saputara is having risky hill roads. Curvatures highlighted in below picture prove to be needful for safety development.

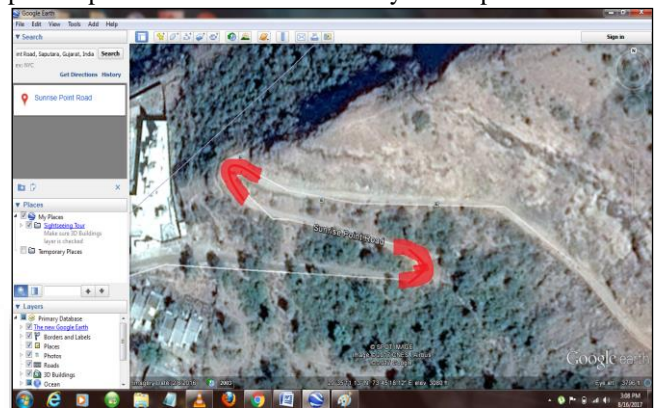


Fig. 2: Location of our project (Google Earth)

In picture 2 location of our project taken from the Google earth our selected location at Saputara hilly road, Gujarat.

Let's introduce S type of curve, in the curve may be in flat road or in sloppy road. In this curve any nature obstacle are there, it can't remove due to obstacle driver can't see the other side of road and it may be accident occur. Here below the picture we can see this type of accident.



Fig. 3: S curve

In recent years the incidence of Road Traffic Accident is increasing at an alarming rate throughout the world. This has resulted in an increase in morbidity and mortality in our country as well. So it seems necessary to invent and implement devices and technologies for the safety of road and highway users. In India hilly roads are need to be developed. Accident occurs more during night time and due to visibility problem, in winter accident rate increases due to

presence of fog and mist which reduces the clear visibility of roads and vehicle coming from opposite direction. so safety on hill roads is a wide scope of study. And development in atomization and technologies can prove to be very helpful in providing safety to hill road travellers and users.

For this kind of problems few solutions like reflecting mirror, sign boards and signalling are available, but they are not providing 100% safety, so new innovation which may be sensor based is required.

II. MATERIALS

A. Ultra Sonic

Ultra Sonic use for calculate speed of vehicle. Name of ultra-sonic is HC-SR04.

B. Horn

Horn use for warn the driver by hornking. The frequency of sound under 50 GHZ.

C. LED

LED light for alert drivers.

D. Programmer chip

Audino uno a brine of our system.

E. Solar panel (20v)

Charge the battery.

F. Battery

Main power source of system.

III. METHODOLOGY

Road accident on hilly road is a major issue. To resolve this issue alertness of drivers is very necessary. By providing vertical post on road side at curvature which will detect speed through radar gun and will do honking and glowing of light if speed of vehicle is more than design speed. To avoid accident on curve.

Using Ultra sonic detecting the speed of the vehicle and let sensor honk the horn and LED light glow when vehicle will be arriving at location of turning which will make drivers alert and reducing the possibility of accident.

We created smart life poles with radar technology. The radar transmits an electromagnetic wave of 24 GHz frequency. And measures the wavelength shift of the reflected wave, which occurs due to the speeding vehicle. These smart life poles communicate with each other to alert drivers on both sides of the blind curve with the sound of a horn.

The smart life poles consist of a vehicle detection and speed sensing radar, a warning system with an LED and a Horn, a PCB unit and lastly, a radio for communication between the poles.

Humans instinctively react to sound. So it uses that concept to provide them with the input.

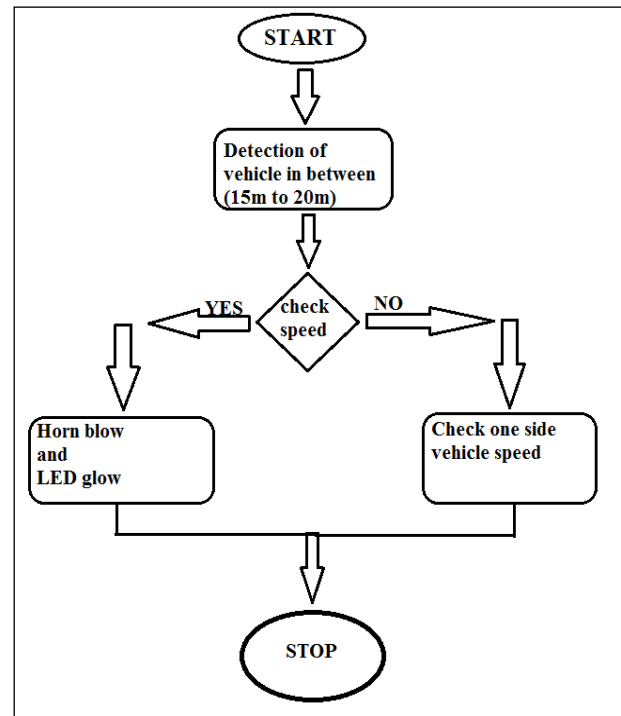


Fig. 4: system flowchart

IV. ANALYSIS

Width of road on hilly region is up to 4m is consider. For that choose ultra-sonic HC-SR04. Which will cover road width. The height of ultra-sonic is kept 1m which can be fix on side of road. Height of ultra-sonic select base on the ground clearance of the every vehicles. However, radar gun and camera with image process can also do same work. But they are very costly, so we selected ultra-sonic for calculation for speed of vehicle.

A horn is use for alert driver. Human react on sound more than vision. Here, hill road are considered as a silent zone. On that base consider sound frequency 50GHZ to 60GHZ on day time and 40GHZ to 50GHZ in night time. To reduce the effect of sound on hill road, sound is consider frequency under 40GHZ. Ultra sonic honk only 5sec. So that it may not effect hilly rocks. Also LED light are provided to for alert driver.

A LED light colour is red, as human knows that red light is symbol of danger. The angle of LED light poll is 900 to the road. And high kept 2m to 2.5m. Which is selected based on vehicle height. Normally car height is 1m to 1.5m but large vehicle height is 2m to 3m. And according to driver's eye sight angle and height, polls are kept at 2m to 2.5m.

To run this system power supply is required. A 24V battery is fixed which will be charge by using solar panels.

Ultra sonic will calculate the speed of vehicle. Now, "How to speed calculate?"

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{
tot-t = tspeed-t1;
t-sec = tot-t/1000.00;
spd = 11/ t-sec;
t2=t1;
}
    
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V. CONCLUSION

- 1) By implementing atomized device rate of accident can be reduced.
- 2) Major accident will be prevented. Overturning of vehicle at U-pin curvatures will not be found.
- 3) Safety of people from death will increase probably.
- 4) This project proves to be economic for long term purpose.

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